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MOŽNÉ VYUŽITÍ ROZŠÍŘENÉ REALITY U POLICIE ČESKÉ REPUBLIKY

POSSIBLE APPLICATION OF AUGMENTED REALITY AT THE POLICE OF THE CZECH REPUBLIC

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ABSTRACT: *The article deals with the possibilities of applying augmented reality technology to the Police of the Czech Republic. With growing technologies and the need to face increasingly complex emergencies and crises, it is necessary to focus on more up-to-date procedures and their management with the help of modern technologies. One of these technologies is augmented reality, which is slowly but surely establishing its place in the processes of preparing for emergencies and their resolution. Compared to virtual reality technology, it is not yet so accessible and user-friendly, but many projects studying this issue have already appeared. The article's objectives are achieved by the methods of explanation, comparison, and identifying the strengths, weaknesses, opportunities, and threats. The results are the findings from the augmented reality environment, which are either being prepared or already used abroad by police forces. The article also includes a table describing the strengths and weaknesses and the opportunities and threats of the application of augmented reality in the Police.*

KEYWORDS: *Augmented reality, Police of the Czech Republic, technology, virtual reality.*

INTRODUCTION

Modern technologies are increasingly in demand not only in the field of ordinary users but also among components of the integrated system and other armed security components. Even in the Czech Republic, one can observe the growth of modern technologies, such as virtual reality, which is already found in many households but is also used in simulators, for example, by the Fire Rescue Service of the Czech Republic or the Police of the Czech Republic. Augmented reality technology is also a slightly less well-known but certainly unforgettable trend. This technology is certainly the future, which needs to be more and more addressed and applied to the processes of all components. The article aims to outline the possible use by the Police of the Czech Republic.

1. POLICE OF THE CZECH REPUBLIC

According to Act No. 239/2000 Coll., on the integrated rescue system and the amendment of some laws, the Police of the Czech Republic is one of the so-called basic components. In addition to the Police of the Czech republic, Providers of emergency medical services, Fire protection units included in the area coverage of the region by fire protection units and the Fire Rescue Service of the Czech Republic are also included here (Česko. Zákon č. 239/2000 Sb., 2000).

The Police of the Czech Republic itself is established under Act No. 273/2008 on the Police of the Czech Republic. The law itself defines the police as a "*unified armed security force*". The main task of Police of the Czech republic is to protect the safety of persons, property, and public order and prevent criminal activities. Tasks are performed according to the criminal code and other tasks in the area of internal order and security according to the international agreement.

The police of the Czech Republic is headed by the police president genmjr. Mgr. Martin Vondrášek, who has been working in this capacity since April 1, 2022, and reports to the Ministry of the Interior. In the organizational structure, the police president is the guarantor of activities:

- Police Presidium of the Czech Republic,
- A unit with national competence,
- A unit with territorially defined competence.

The organizational structure further comprises selected sections:

- Deputy Chiefs of Police,
- Services Directorate (police, traffic police),
- Office of the Chief of Police,
- Crisis management department,
- Departments such as internal controls and international police cooperation, etc.

The Police of the Czech Republic uses a symbol that was designed in 1991 and is the basis of visual communication. (Česko. Zákon č. 273/2008 Sb., 2008).

In recent years, as with other components of the integrated rescue system, the Police of the Czech Republic has been developing modern technology for preparing solutions to various emergencies. The most used technology today is virtual reality technology. In the conditions of the police, it specifically began to be used, for example, for training in passing on a death report to survivors. Simulations in VR should also be able to implement scenarios such as communication with a person demonstrating suicidal intent, which therefore also reflects the tasks according to the typical activities of the components of the integrated rescue system (Virtuální, 2021). This demonstration is shown in figure 1.

Figure 1 Demonstration of the use of virtual reality in practice (Virtuální realita, 2021)

This technology can also be used for educational purposes. One possibility is the work by the authors Kavan Štěpán and Rathauský Zdeněk, who described the possible use of virtual reality for an educational escape game (KAVAN, 2022). Escape game in virtual reality is shown in figure 2.

Figure 2 Sample from the escape game by Kavan, Š., and Rathauský, Z. (KAVAN, 2022)

The Utilization of simulation and virtual reality tools in the education of fire and rescue services also discusses the possibilities of using virtual reality. In this article the authors focused on the possibilities of application not only in the police but in all rescue services (Fanfarová, 2017).

A little less known technology is augmented reality. Augmented reality itself is currently most used in the development of new games, but it also finds its place in the areas of the integrated rescue system. This article aims to outline the potential for use by the Police of the Czech Republic and to describe the limits that this technology brings with it so far.

2. AUGMENTED REALITY AND THE POSSIBILITIES OF ITS USE

Augmented reality is an often-mentioned technology in recent years that certainly deserves its attention. First of all, however, it is important to mention what is the difference between competing virtual reality. Virtual reality offers the possibility of simulating the real world using 3D tools. The user uses this technology with the help of a headset, such as the HTC Vive. As Sabri Mustafa describes in his work "*Virtual reality is an experience that immerses the user in a simulated environment and surrounds him with the sensations of the real world"* (Sabri, 2021).

Users in this environment react to different environments just as they do in real life, even though the visualizations still do not fully simulate the real world. The disadvantage of this technology is the dependence on the PC and its equipment. For example, the following minimum system requirements are recommended for HTC Vive glasses:

- Intel Core i5-4590/AMD FX 8350 equivalent,
- NVIDIA GeForce GTX 970, AMD Radeon R9 290 equivalent,
- 4 GB RAM,
- HDMI 1.4, DisplayPort 1.2,
- 1x USB 2.0,
- Windows 7 SP1 (What are the system requirements, c2011-2022).

Augmented reality is described by Bhosale Sachin in his work as "an enhanced form of the real physical world that is supplemented with visual sounds, elements, and other sensory stimuli". Compared to virtual reality, it is not tied to a computer, and its use itself is not so demanding on system requirements. Augmented reality can often be found nowadays in mobile applications that promote various product ranges. An example is an application from IKEA, which created an application for placing IKEA products in homes, making it easier to choose the right product and place (Bhosale, 2021).

Another sector is mobile or console games and industry. Thanks to the possibility of use in mobile devices, tablets, or special glasses, such as Hololens, their potential is also more diverse.

The possible use of augmented reality by the Police of the Czech Republic can be found in documents such as "*Improving Our View of the World – Police and Augmented Reality technology*", which was published by the authors Thomas J. Cowper and Michael E. Buerger for the New York Police. In the work, the authors describe the areas in which they see a vision of the future for making the tasks of the police work more efficient and connecting with this technology. Here, for example, they highlight proposals such as:

- improved situational awareness during dynamic and dangerous incidents increased cohesion between team members and better coordination with command staff,
- advanced optics providing zoom,
- improved ability to gather information,
- the use of video, audio, and AR sensing devices used to visualize blood patterns, bloodstains, and other forensic data detectable by sensors available at crime scenes,
- calculating distance and height and using AR maps,
- connection with drones,

- realistic training scenarios to simulate a dangerous police environment
- incorporating real equipment and other participants into the scenario and more (Cowper, 2003).

In addition to this document, which partially outlined the possible use in forensic sciences, a lot of applications support many of the proposed tools. One such application is Augmented Forensics.

The app allows you to capture a scene and simulate it and create it in photorealistic detail, thus simulating a crime scene. A scene simulated in this way can also be presented during court proceedings and thus enable decision-making support (Augmented, c2018-2019). A collage of the application is shown in figure 3.

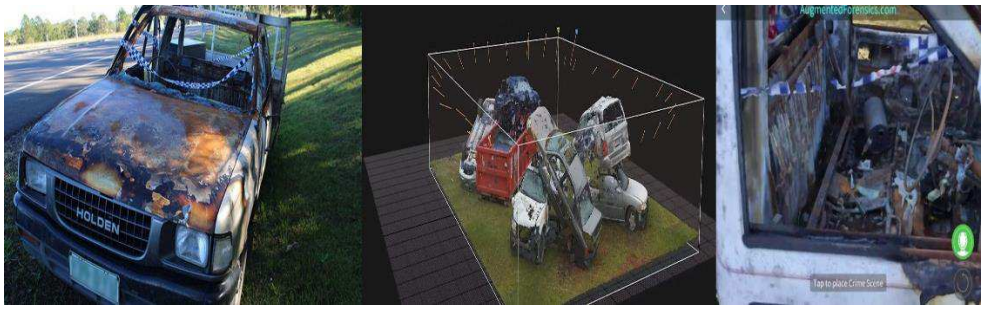

Figure 3 Sample of Augmented Forensics (Augmented forensics, c2018-2019)

Another option is the tuServ app, developed by Black Marble. It is an app that can help police officers in the field map crime scenes in real time and create digital markers. These tags allow the insertion of 3D objects, possibly also audio/video tracks. The application also can share, so data can be transferred quickly (tuServ, c2022). An example of an application is shown in Figure 4. Part of this technology and application is communication. It is, therefore, necessary to support it. This issue is addressed in the article Possibilities of implementing new technologies into the communication interface of a simulator designed to support crisis management by Barta, J. and Kalenda, J. (Barta, 2021).

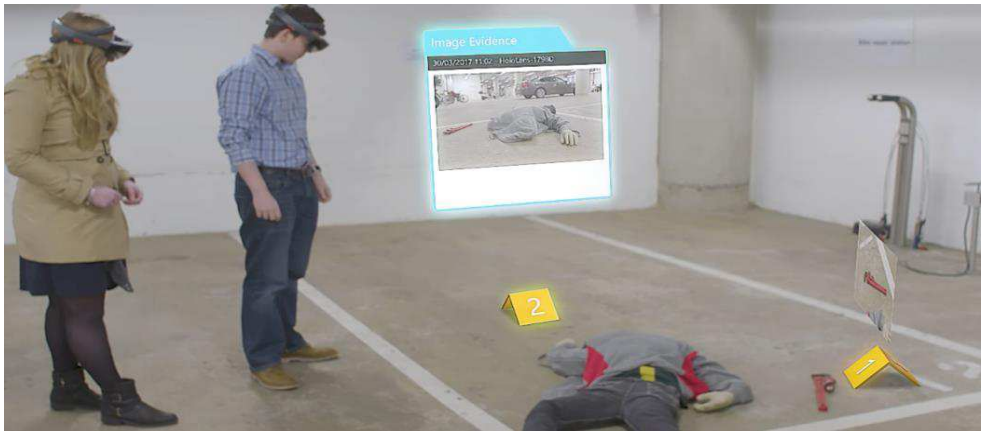

Figure 4 Sample of tuServ (tuServ, c2022)

The application of this technology is thus evident in the field of forensic sciences, but also the documentation of traffic accidents, searches for missing persons or during exercises, and as methodical support. Limiting elements can be the supported equipment and financial demands. In the case of the Hololens 2 glasses, there is also a deficiency in the battery capacity and the field of vision that the user observes. As has already been written, the technology of augmented reality is still being improved and in the future, it will certainly gain ground in the field of the Police of the Czech Republic (How AR, 2017).

Mentions of the use of augmented reality can also be found in the Population Protection Concept until 2025 with a view to 2030, which highlights work with not only virtual but also augmented reality.

A table 1 was compiled to point out the shortcomings and opportunities of augmented reality (Koncepce, 2020).

Table 1 Identifying the strengths, weaknesses, opportunities, and threats

	HELPFUL	**HARMFUL**
INTERNAL	**STRENGTHS** • **The future (constantly improving technology)** • **Simplification of work** • **Quick training** • **Ability to support multiple devices**	**WEAKNESSES** • **Battery capacity in the case of a headset (battery life about 2 hours)** • **Bound to Wifi** • **Discomfort** • **Price**
OUTER	**OPPORTUNITIES** • **Greater awareness** • **Field application** • **New job positions** • **Wide usage**	**THREATS** • **Distrust in technology** • **Refusal to work with AR** • **Damage to the machine** • **Abuse**

As can be seen in Table 1, four areas are divided here. Strengths are included in the first. Here, the future was chosen as a strong point, as future development brings with it many improvements, as well as more diverse operations and use in the field. Simplification of work is also a strong point in the case of the headset. It will allow the user to control functions with the help of voice, so the user can do more things at once. Quick training is another advantage, as working with augmented reality is not difficult for the average user, and the possibility of supporting multiple devices is one of the biggest advantages, as this technology can be applied not only to headsets but also to mobile devices and tablets.

Among the weaknesses was the battery capacity. This is not a problem with mobile devices, but in the case of a headset, the battery life is only about 2 hours. In the same case, the lack of sim card support is also a weakness, when the user is dependent on Wifi or the created hotspot. Discomfort can also be included here, when not every user may be comfortable with putting on a headset or, in the second case, handling a mobile device or tablet. The last weak point is the purchase price, which in the case of the Hololens 2 headset is about 80,000 Czech crowns.

The opportunity lies, for example, in greater awareness of this technology, the application of augmented reality in the field, and the creation of new jobs for augmented reality operators. The biggest opportunity is widespread use across the police force.
Threats included distrust in this technology, which could lead to the rejection of work with augmented reality. Damage to the machine or its abuse, for example by stealing data, can be considered another threat.

CONCLUSION

The use of augmented reality technology is slowly but surely becoming known not only to the general public but also to members of rescue teams. This article discussed the possible application of augmented reality to the Police of the Czech Republic. The basic starting points of the Police of the

Czech Republic and virtual and augmented reality technologies were presented here. The article is based on literary and publication outputs and highlights the current ones from the Population Protection Concept until 2025 with a view to 2030.

To illustrate the limits of the use of this technology identifying the strengths, weaknesses, opportunities, and threats table was established. The potential use by the Police of the Czech Republic was demonstrated in examples of applications that serve mainly for forensic sciences but can also be applied to other components of the Police of the Czech Republic.

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